

REMARKS

Applicants acknowledge receipt of an Office Action dated May 24, 2006. In this response Applicants have amended claims 1, 5, 15 and 16. Claims 2 and 4 have been canceled without prejudice or disclaimer. Support for the amendment to claims 1, 15 and 16 can be found at least in original claims 2 and 4. Following entry of these amendments, claims 1, 3 and 5-16 are pending in the application.

Reconsideration of the present application is respectfully requested in view of the foregoing amendments and the remarks which follow.

Allowable Subject Matter

Applicants appreciate the indication that claim 5 contains allowable subject matter. Claim 5 has been amended to be in independent form, and is thus in *prima facie* condition for allowance.

Rejections Under 35 U.S.C. §§ 102 and 103

Claims 1-4, 7-10 and 14-16 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Reissue 38,051 to Adamczyk et al. (hereinafter “Adamczyk”). Claims 6 and 11-13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Adamczyk in view of U.S. Patent 6,813,884 to Shigapov et al. (hereinafter “Shigapov”).

Independent claim 1, as amended, recites “a first deterioration diagnosing section diagnosing a deterioration of the exhaust aftertreatment apparatus on the basis of the first and second ratios obtained during an engine operating condition change from a lean burn operation to a rich burn operation or from the rich burn operation to the lean burn operation”, and “a second deterioration diagnosing section diagnosing the deterioration of the exhaust aftertreatment apparatus on the basis of the second ratio obtained by transiting the engine operating condition to a stoichiometric air/fuel ratio operating condition, when the first deterioration diagnosing section diagnoses that the exhaust aftertreatment apparatus is deteriorated.” Thus, in claim 1, the diagnosing sections collectively perform a deterioration

diagnosis in two stages. Adamczyk fails to disclose the specific two stage deterioration diagnosis recited in claim 1, or the advantages attendant thereto.

Adamczyk fails to disclose the specific two stage deterioration diagnosis recited in claim 1, and merely discloses a method for restoring the exhaust purifying capability of a sulfur contaminated catalytic converter (abstract). While Adamczyk discloses measuring the catalytic converter efficiency with upstream and downstream exhaust gas oxygen sensors (abstract), Adamczyk does not perform the deterioration diagnosis in two stages as follows: (1) a first stage where the diagnosis is performed on the basis of the first and second ratios obtained during an engine operating condition change from a lean burn operation to a rich burn operation or from the rich burn operation to the lean burn operation, and (2) a second stage where when the first diagnosis determines that deterioration has occurred, a second diagnosis is performed on the basis of the second ratio obtained by transiting the engine operating condition to a stoichiometric air/fuel ratio operating condition.

Moreover, while Adamczyk discloses switching between different air-fuel ratio states, much of this switching is performed in the context of decontaminating the sulfur from the catalytic converter after it is determined that the catalytic converter is contaminated. In particular, Adamczyk discloses that when it is detected that the catalytic converter is contaminated, in order to decontaminate sulfur from the catalytic converter, the temperature of the catalytic converter is increased by retarding an ignition timing, by firstly setting the air-fuel ratio to a rich state and thereafter setting the air-fuel ratio to a lean state, so as to effectively release sulfur from the catalytic converter. The setting method of the air-fuel ratio discussed in Adamczyk merely sets the air-fuel ratio to the rich and lean states in order to effectively release sulfur from the catalytic converter.

The Patent Office cites to FIG. 5 and claim 16 of Adamczyk as disclosing the first deterioration diagnosing section, and to FIGs. 6 and 7 and claim 16 as disclosing the second deterioration diagnosing section of claim 1. FIG. 5 of Adamczyk, however, merely illustrates a routine of managing decontamination of catalytic converter 20, while FIGs. 6 and 7 merely illustrate a routine of controlling on-board sulfur removal. Further, claim 16 merely

illustrates a catalytic converter efficiency measuring process and a decontamination process. FIGs. 5-7 and claim 16 of Adamczyk do not suggest the specific two stage deterioration diagnosis recited in claim 1.

Further, Adamczyk fails to suggest the advantages of the two-stage deterioration diagnosis recited in claim 1. With a combination of the first and second deterioration diagnoses, the diagnosis system according to claim 1 ensures a high accuracy of the diagnosis while suppressing the deterioration of fuel consumption. In the instance that the first diagnosis of executing a diagnosis during a transition state from a rich state to a lean state or from the lean state to the rich state diagnoses that the exhaust aftertreatment apparatus is deteriorated, a second diagnosis comprising setting the air-fuel ratio at a stoichiometric state is performed. The second diagnosis performed by the second deterioration diagnosing section, which tends to uneconomically consume fuel but provides a more accurate diagnosis, is executed only when the first deterioration diagnosing section diagnoses that the exhaust aftertreatment apparatus is deteriorated (See present specification, paragraph [0056]). Adamczyk, failing to disclose the specific two stage deterioration diagnosis recited in claim 1, fails to suggest this advantage.

Shigapov fails to cure the deficiencies of Adamczyk.

Independent claims 15 and 16 respectively recite “executing a first diagnosis for diagnosing a deterioration of the exhaust aftertreatment apparatus on the basis of the first and second ratios obtained during an engine operating condition change from a lean burn operation to a rich burn operation or from the rich burn operation to the lean burn operation; and executing a second diagnosis for diagnosing the deterioration of the exhaust aftertreatment apparatus on the basis of the second ratio obtained by transiting the engine operating condition to a stoichiometric air/fuel ratio operating condition, when the first deterioration diagnosing section diagnoses that the exhaust aftertreatment apparatus is deteriorated”, and “first deterioration diagnosing means for diagnosing a deterioration of the exhaust aftertreatment apparatus on the basis of the first and second ratios obtained during an engine operating condition change from a lean burn operation to a rich burn operation or from

the rich burn operation to the lean burn operation; and second deterioration diagnosing means for diagnosing the deterioration of the exhaust aftertreatment apparatus on the basis of the second ratio by transiting the engine operating condition to a stoichiometric air/fuel ratio operating condition, when the first deterioration diagnosing means diagnoses that the exhaust aftertreatment apparatus is deteriorated”, and are thus patentable for reasons analogous to claim 1.

The dependent claims are patentable by virtue of their dependence from claim 1, as well as for further patentable features recited therein.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully submit that all of the pending claims are now in condition for allowance. An early notice to this effect is earnestly solicited. If there are any questions regarding the application, the Examiner is invited to contact the undersigned at the number below.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date August 24, 2006
FOLEY & LARDNER LLP
Customer Number: 22428
Telephone: (202) 672-5414
Facsimile: (202) 672-5399

By Thomas G. Bilodeau
Richard L. Schwaab
Attorney for Applicants
Registration No. 25,479

Thomas G. Bilodeau
Attorney for Applicant
Registration No. 43,438